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FEDERAL - STATE COOPERATIVE

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for

Montana and Northern Wyoming
Upper Missouri, Upper Columbia and Yellowstone Rivers

By
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Montana Agricultural Experiment Station

In cooperation with the U. S. Forest Service, U. S. Geological Survey, National Park Service, U. S. Bureau of Reclamation, State Engineers of Montana and Wyoming and other Federal, State and local organizations.

As of
FEB. 1, 1951

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FEDERAL-STATE COOPERATIVE
SNOW SURVEY AND IRRIGATION WATER FORECASTS

FOR

MONTANA and NORTHERN WYOMING

Upper Missouri and Upper Columbia River
Basins

Report Prepared
by

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IRRIGATION WATER SUPPLY
OUTLOOK FOR 1951
AS OF FEBRUARY 1, 1951

Snow survey measurements made on or about the First of February at a few key stations over the Upper Missouri River Basin indicate that the snow pack is very close to average conditions. Comparative data indicates about 10% above average in the northwest to 2% below average in the southwest. The central portion of the basin is about average. Northern Wyoming Basins indicate a very similar condition, however, some of the older courses show a higher percentage of average than do the courses with a short period of record. In general there is less water in the mountains than for the last two years.

Valley precipitation station data close to the foot of the Rocky Mountains shows a slight plus deviation from the normal, while the stations farther east show a decided minus deviation. Valley precipitation stations in Northern Wyoming show a decided minus deviation, while the snow pack measured indicates a close-to-average condition. In some cases on the Wind River, as much as 50 to 70% above average water content is common. These opposite deviations will present a problem in forecasting at a later date, with the minus precipitation.

Stream flow conditions on the Upper Missouri have remained above the median during the season until the cold snap in late January when a decided drop was noticed.

Water storage throughout the state is in all cases better than last year and considerably above the average in most reservoirs.

Snow measurements made on the Upper Columbia Basin indicate a slightly above-average condition, judging from the stations that were measured. Precipitation stations in the area show a consistent positive deviation from the normal accumulated rainfall from October to date. Water in storage is considerably above last year and well above the 10-year average 1940-49.

STORAGE IN RESERVOIRS OF MONTANA, FEBRUARY 1, 1951

MISSOURI RIVER BASIN — Reservoir Volumes in 10,000's of Acre Feet

RESERVOIR	Location on or Diversion from	Usable Capacity	Contents This Year Feb. 1 1951	Contents Last Year Feb. 1 1950	Feb. 1 10-Year Average 1940-49
Lake Sewall	Missouri	37.8	23.6	29.2	23.0
Hauser Lake	Missouri	52.1	41.3	35.2	53.6
Ft. Peck Res.	Missouri	19,000.0	12,440.0	11,280.0	9,296.0
Ruby Res.	Ruby	38.5	-	-	-
Harrison Lake	Willow Cr.	17.8	-	-	-
Hebgen Res.	Madison River	345.0	239.2	207.6	227.1
Madison Res.	Madison River	41.0	30.8	34.3	34.4
Smith River Res.	Smith River	10.7	-	-	-
Gibson Res.	N.Fk. Sun River	105.0	75.4	34.1	56.5
Willow Creek	N.Fk. Sun-Willow Cr.	32.3	23.1	2.5	12.6
Pishkun Res.	N.Fk. Sun River	32.0	19.0	19.2	18.7
Lower Two Medecine L.	Two Medicine River	14.0	-	-	-
Four Horns Res.	Badger Creek	20.0	-	5.9	7.9
Birch Creek Res.	Birch Creek	30.0	24.9	16.7	21.0
Lake Francis Res.	Birch Creek	112.0	93.8	81.7	75.9
Ackley Lake	Judith River	5.8	-	-	4.3
Durand Res.	N.Fk. Musselshell	7.0	5.4	-	-
Dead Man Basin	Musselshell River	52.5	-	-	-
Martinsdale Res.	So.Fk. Musselshell	23.1	12.8	-	-
Fresno Res.	Milk River	127.2	68.6	8.3	44.4
Nelson Res.	Milk River	66.8	-	5.4	-
Mystic Lake	W.Rosebud Creek	20.8	11.9	10.9	8.5
Cooney Res.	Red Lodge Creek	27.5	-	10.7	6.9
Tongue Res.	Tongue River	73.9	8.1	5.5	7.9
Sherburne Lake Res.	Swiftcurrent Creek	66.1	23.3	33.6	19.8
Lake Helena	Missouri River	10.4	5.2	3.0	-
YELLOWSTONE RIVER BASIN (Wyoming)					
Buffalo Bill	Shoshone	456.6	305.9	203.9	271.0
Sunshine	Greybull	52.0			
Pilot Butte	Wind River	30.1			
Bull Lake	Wind River	155.0			
COLUMBIA RIVER BASIN					
Georgetown Lake	Flint Creek	31.0	25.2	18.8	-
E.Fk. Rock Cr. Res.	E.Fk. Rock Creek	16.0	-	-	-
Nevada Creek Res.	Nevada Creek	12.6	-	-	-
W.Fk. Bitterroot Res.	W.Fk. Bitterroot	31.7	10.0	0.6	7.0
Como Lake	Rock Creek	34.8	-	-	-
Flathead Lake (Sommers)	Flathead River	1,791.0	1,107.0	958.1	559.5
Little Bitterroot	Little Bitterroot *	37.1	33.3	26.5	-
Dry Fork Res.	Dry Fork Creek *	6.7	39.6	34.3	-
Mission Valley Reservoirs	Mission Valley (Flathead River) **	105.0	44.1	24.1	-

* Comprise two reservoirs on Dry Creek
* Comprise two reservoirs on Little Bitterroot River
**Comprise nine small reservoirs on Mission Valley Project Indian Reclamation Service

PRECIPITATION DATA FOR FEBRUARY 1, 1951
MONTANA

Station	Elevation	1950 Precipitation Oct.	Nov.	Dec.	1951 Jan.	Dept. From Normal	Accumulated Precipitation 1950-51	Normal	Departure
WEST OF DIVIDE									
Butte (Airport)	5533	0.53	1.20	0.59	0.92	+0.52	3.24	2.05	+1.19
Phillipsburg	5280	0.51	1.25	0.64	1.43	+0.64	3.83	3.28	+0.55
Hamilton	3529	1.78	1.58	0.71	1.21	+0.42	5.28	3.22	+2.06
West Glacier	3154	5.87	2.35	5.17	4.77	+1.84	18.16	11.32	+6.84
Summit (Marias)	5213	7.53	6.13	5.88	5.37	+1.95	24.91	11.69	+13.22
Ovando 1 SW	4101	1.02	2.38	1.63	1.53	-0.07	6.56	6.10	+0.46
Trout Creek	2485	6.36	3.95	4.67	5.42	+1.73	20.40	13.87	+6.53
Thompson Falls	2435	4.36	2.79	2.25	2.97	+0.96	12.37	8.25	+4.12
Average (8)		3.50	2.70	2.69	2.95		11.84	7.47	+4.37
CENTRAL DIVISION									
Babb	4300	1.04	1.23	0.85	0.65	-0.29	3.77	4.05	-0.28
Havre	2488	0.24	0.41	0.32	0.39	-0.34	1.36	2.62	-1.26
Great Falls (Airport)	3664	0.03	1.19	0.58	0.41	-0.20	2.21	2.80	-0.59
Helena (Airport)	3893	0.43	1.50	0.61	0.38	-0.18	2.91	2.09	+0.82
Lewistown (Airport)	4132	0.74	0.83	1.05	0.17	-0.56	2.79	1.50	+1.29
Livingston	4485	0.94	1.05	0.81	0.38	-0.16	3.18	3.11	+0.07
Wisdom	6058	1.06	1.15	0.48	0.71	+0.09	3.40	3.22	+0.18
West Yellowstone	6669	2.88	1.79	1.95	2.28	-0.53	8.90	8.04	+0.86
Mystic Lake	6558	0.86	2.37	1.08	2.02	+0.88	6.33	5.60	+0.73
Average (9)		0.91	1.28	0.85	0.82		3.87	3.67	+0.20
EASTERN DIVISION									
Malta	2255	0.39	0.18	0.35	0.49	+0.02	1.41	2.04	-0.63
Ft. Peck	2180	0.24	0.25	0.23	0.48	+0.10	1.20	1.88	-0.68
Medicine Lake	1962	0.50	0.10	0.21	0.36	+0.05	1.17	1.67	-0.50
Circle	2428	0.54	0.18	0.13	0.33	-0.34	1.18	2.84	-1.66
Billings #2	3139	0.83	0.88	0.68	0.70	+0.07	3.09	3.18	-0.09
Miles City	2392	0.40	0.52	0.31	0.08	-0.58	1.31	2.76	-1.45
Glendive	2076	0.45	E0.16	0.07	0.37	-0.15	1.05	2.32	-1.27
Broadus	3026	0.46	0.41	0.40	0.48	-0.02	1.75	2.63	-0.88
Average (8)		0.48	0.34	0.30	0.41		1.52	2.42	-0.90

PRECIPITATION DATA FOR FEBRUARY 1, 1951
NORTHERN WYOMING

Station	Elevation	1950 Precipitation			1951		Accumulated Precipitation		
		Oct.	Nov.	Dec.	Jan.	Dept. From Normal	1950-51	Normal	Departure
BIG HORN RIVER BASIN									
Cody	4984	.08	1.19	.28	.77	+.50	2.33	1.81	+0.52
Lovell	3825	.02	.32	.03	.09	-.33	0.46	1.57	-1.11
Worland	4061	T	.10	.40	T	-.35	0.50	1.67	-1.17
Sunshine 4 SW	6930	.17	1.04	.29	.37	-.17	1.87	3.35	-1.48
Thermopolis	4336	.19	.80	.21	.07	-.32	1.27	3.54	-2.27
Riverton	4954	.22	.57	.00	.05	-.12	0.84	2.01	-1.17
Dubois	6917	.37	.71	T	.16	-.31	1.21	2.00	-0.79
Average		.15	.68	.17	.22		1.22	2.13	-0.91
TONGUE RIVER BASIN									
Sheridan	4021	.51	1.05	.58	.55	-.30	2.69	3.19	-0.50
POWDER RIVER BASIN									
Arvada	3680	.22	.31	.06	.16	-.29	0.75	2.43	-1.68
Metz Ranch	5280	.37	.67	.19	.46	-.02	1.69	2.20	-0.51
Gillette	4542	.63	.72	.05	.50	-.18	1.90	2.99	-1.09
Nine Mile Creek	5000	.70	.40	.05	Missing	-	-	-	-
Mid West	4850	.83	.47	.28	.23	-.31	1.81	2.83	-1.02
Average		.55	.51	.13	.34		1.54	2.59	-1.05

MONTANA SNOW SURVEYS FEBRUARY 1, 1951

COLUMBIA RIVER BASIN

DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey 1951	Snow Depth (In.) 1951	Water Content (Inches) Feb. 1 1951	Past Records 1950	Past Records 1949	Average Data February 1 Avg.	Average Data February 1 %Avg.	Years of Record	Ground Surface Condition
FLATHEAD RIVER											
Desert Mountain	13A2	5600	Jan. 31	43.5	11.9	13.7	9.8	9.4	127	5	G.N.F.
Marias Pass	13A5	5250	Feb. 1	44.6	13.7	20.6	12.6	11.1	123	17	--
Snow Lab. #16	13A9	5200	Jan. 23	46.0	13.1	21.2	13.4	15.8	83	5	--
Trout Lake #2	13A12	3600									
UPPER CLARK FORK											
Chessman Res.	12C5	6200	Feb. 7	12.8	3.1	3.4	4.4	3.1	100	16	--
Pipestone Pass	12D1	7200	Feb. 3	19.6	3.0	1.4	5.2	2.9	103	12	G.F.
Tenmile, Lower	12C2	6250	Feb. 5	23.1	5.5	4.6	6.3	4.5	122	16	--
Tenmile, Middle	12C3	6800	Feb. 6	31.4	8.2	6.9	8.7	6.3	130	17	--
Tenmile, Upper	12C4	8000	Feb. 6	36.3	10.0	8.4	10.6	8.0	125	17	--
Lookout	15B2	5250	Feb. 2	93.0	27.3	30.9	28.2	21.0	130	15	--
BITTERROOT											
Gibbons Pass	13D2	7100	Jan. 31	55.8	16.9	17.2	-	14.0	120	11	G.N.F.
Nezperce Camp	14D2	5580	Feb. 1	37.2	8.4	8.6	13.8	8.6	98	14	G.N.F.
Nezperce Pass	14D1	6575	Jan. 31	43.5	11.3	9.6	16.3	11.1	102	14	G.N.F.
FLATHEAD RIVER											
Basin Creek	13B14	5000	Jan. 29	26.5	7.4	New Course				1	G.N.F.
Holbrook	13B13	4530	Jan. 29	26.8	6.4	New Course				1	G.N.F.
Quintonkon	13A13	3800									
Twin Creeks	13B11	3580									
KOOTENAI											
Fernie	Canada	3500	Feb. 5	32.3	7.6	11.7	6.8	5.9	129	12	--
New Fernie	Canada		Feb. 6	42.6	10.4	-	-	-	-	1	--
Gray Creek	Canada	5100	Jan. 29	52.1	13.5	12.5	12.1	12.7	108	3	--
Marble Canyon	Canada	5000	Jan. 31	64.7	19.9	12.9	7.9	12.2	163	4	--
Sinclair Pass	Canada	4500	Jan. 30	26.6	5.1	5.2	3.2	4.7	109	4	--

MONTANA SNOW SURVEYS FEBRUARY 1, 1951

MISSOURI BASIN

DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey 1951	Snow Depth (In.) 1951	Water Content (Inches) Feb. 1 1951	Past Records 1950	Past Records 1949	Average Data February 1 Avg.	Average Data February 1 %Avg.	Years of Record	Ground Surface Condition
MADISON RIVER											
Hebgen	11E5	6550	Jan. 31	23.4	5.4	7.7	11.1	8.2	66	17	--
West Yellowstone	11E7	6700	Feb. 1	30.2	8.0	9.9	9.7	7.3	110	14	--
21-Mile	11E6	7150	Feb. 1	36.1	10.6	14.5	14.2	10.4	102	14	G.F.
Big Springs	11E9	6500	Jan. 31	45.0	13.0	14.9	15.1	12.0	109	16	--
Island Park	11E10	3600	Feb. 1	35.0	9.1	12.8	11.6	9.5	94	16	--
Valley View	11E8	6500	Feb. 1	31.0	7.4	12.0	10.0	8.9	83	6	--
Norris Basin	10E2	7500	Feb. 1	25.6	6.2	-	-	-	-	1	--
GALLATIN RIVER											
Mystic Lake	10D2	6600	Feb. 3	20.7	5.2	2.8	6.6	5.1	102	15	G.F.
New World	10D1	6700	Feb. 3	23.7	6.1	3.2	8.3	7.9	77	4	G.F.
21-Mile	11E6	7150	Feb. 1	36.1	10.6	14.5	14.2	10.4	102	14	G.F.
MISSOURI RIVER MAIN STEM											
Chessman Reservoir	12C5	6200	Feb. 7	12.8	3.1	3.4	4.4	3.1	100	16	--
Pipestone Pass	12D1	7200	Feb. 3	19.6	3.0	1.4	5.2	2.9	103	12	G.F.
Tenmile, Lower	12C2	6250	Feb. 5	23.1	5.5	4.6	6.3	4.5	122	16	--
Tenmile, Middle	12C3	6800	Feb. 6	31.4	8.2	6.9	8.7	6.3	130	17	--
Tenmile, Upper	12C4	8000	Feb. 6	36.3	10.0	8.4	10.6	8.0	125	17	--
(Marias River)											
Marias Pass	12B5	5250	Feb. 1	44.6	13.7	20.6	12.6	11.1	123	17	--
Snow Lab. #16	13A9	5200	Jan. 23	46.0	13.1	21.2	13.4	15.8	83	5	--
UPPER YELLOWSTONE											
Canyon	10E3	7750	Feb. 1	37.6	8.7	11.6	10.2	9.5	92	6	--
Cooke City	10D7	7400	Feb. 1	23.6	5.2	4.2	6.7	5.5	95	5	--
Lake Camp	10E4	7850	Feb. 1	30.0	6.7	8.1	8.4	5.7	118	6	--
Lupine	10E1	7300	Feb. 3	29.0	6.4	7.4	8.6	5.9	108	10	--
Lewis Lake Divide	10E9	7000	Feb. 2	99.0	32.3	35.2	39.8	30.7	105	33	--

MISSOURI BASIN IN WYOMING

DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey 1951	Snow Depth (In.) 1951	Water Content (Inches) Feb. 1 1951	Past Records 1950	Past Records 1949	Average Data February 1 Avg.	Average Data February 1 %Avg.	Years of Record	Ground Surface Condition
LOWER YELLOWSTONE (Wind River)											
Brooks Lake #3	10F2	9200	Feb. 1	65.0	22.2	21.9	17.3	14.3	155	11	G.F.
Burroughs Creek	9F6	8800	Jan. 31	55.2	19.0	15.3	9.8	14.7	104	3	G.F.
Dinwoodie	9F10	10000	Jan. 30	42.6	12.0	13.5	9.1	11.5	105	3	G.F.
Dry Creek	9F9	9500	Jan. 30	24.4	5.6	8.2	5.1	6.3	89	3	G.F.
Du Noir	9F2	8750	Feb. 1	31.6	8.0	10.5	6.2	6.7	112	10	G.F.
Geyser Creek	9F3	8500	Feb. 1	31.4	7.7	8.0	6.3	7.3	106	3	G.F.
Hobbs Park	9G2	10000	Jan. 27	36.3	9.9	21.4	12.8	14.7	67	3	G.F.
Little Warm	9F4	9500	Feb. 2	56.0	17.2	16.7	-	-	-	2	G.F.
Mosquite Park	9G3	9500	Jan. 27	22.3	5.3	11.8	6.8	6.9	77	8	G.F.
Sheridan Creek R.S.	9F1	7500	Feb. 1	30.6	7.7	6.2	6.3	5.0	154	10	G.F.
St. Lawrence R.S.	9F11	9000	Jan. 28	17.9	3.5	8.1	5.7	5.4	65	8	G.F.
T-Cross Ranch	9F5	8000	Jan. 31	31.2	7.7	5.5	5.5	4.6	167	11	G.F.
Trout Creek	9G1	8400	Jan. 27	7.4	1.2	5.2	5.7	4.0	30	3	G.F.
Togwotee Pass	9F1	9600	Jan. 30	79.0	23.9	20.4	20.9	18.1	132	16	--
Kendall	9F12	7900									
Loomis Park	10F5	8500									
Black Rock	10F3	8600	Jan. 30	64.0	18.5	18.4	15.7	13.8	134	16	--
(Popo Agie River)											
Blue Ridge	8G2	9500	Jan. 26	32.7	7.7	13.8	10.0	6.8	111	11	G.F.
Grannier Meadows	8G4	9000	Jan. 25	41.6	10.2	16.3	11.1	8.4	121	11	G.F.
Larsen Creek	9G4	9000									
Sawmill Glade	8G1	8500	Jan. 26	10.0	2.2	4.9	5.9	4.0	53	10	G.F.
South Pass	8G3	9000	Jan. 25	39.1	10.7	14.9	11.7	8.9	120	10	G.F.
Mulligan Park	9G5	8900									
Dutch Joe	9C6	8700									
BIG HORN RIVER (Wyoming)											
Beavers Mill	9F8	8000	Jan. 30	28.7	6.3	6.5	5.5	6.1	103	3	G.F.
Owl Creek	8F1	8700	Jan. 29	16.8	4.0	4.8	4.2	4.3	93	3	G.F.
Tensleep R.S.	7E3	8300									
Timber Creek	9E2	9000	Jan. 30	14.0	2.9	3.3	5.0	3.4		3	G.F.
Ranger Creek	7E1	8800									
Wood River	9E7	8000									

MONTANA SNOW SURVEYS FEBRUARY 1, 1951

MISSOURI BASIN in WYOMING

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SHOSHONE RIVER											
East Entrance	10E6	7000	Jan. 31	37.3	9.4	8.6	10.7	9.6	98	3	G.F.
Sylvan Pass	10E5	7100	Feb. 3	45.7	11.4	12.1	10.9	10.6	107	8	G.F.
TONGUE RIVER											
Burgess R.S.	7E4	7900	Feb. 1	39.6	14.3	--	--	--	--	1	--
Big Goose R.S.	7E2	7700	Feb. 1	13.8	3.1	--	--	--	--	1	--
Dome Lake	7E5	8800									
POWDER RIVER											
Muddy Pass	7E7	9700	Jan. 31	22.8	4.8	-	-	-	-	1	G.F.
Sour Dough	6F1	8500									
Soldier Park	7E6	8700	Feb. 1	17.8	3.7	--	--	-	-	1	--
CHEYENNE RIVER (South Dakota)											
Upper Spearfish	1 S.D.	6500	Jan. 30	13.9	2.6						
Upper Castle	2 S.D.	6800	Jan. 30	17.2	2.2						
Deerfield	3 S.D.	6000	Jan. 30	3.3	0.9						

Federal - State - Private

COOPERATIVE SNOW SURVEYS

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Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"